

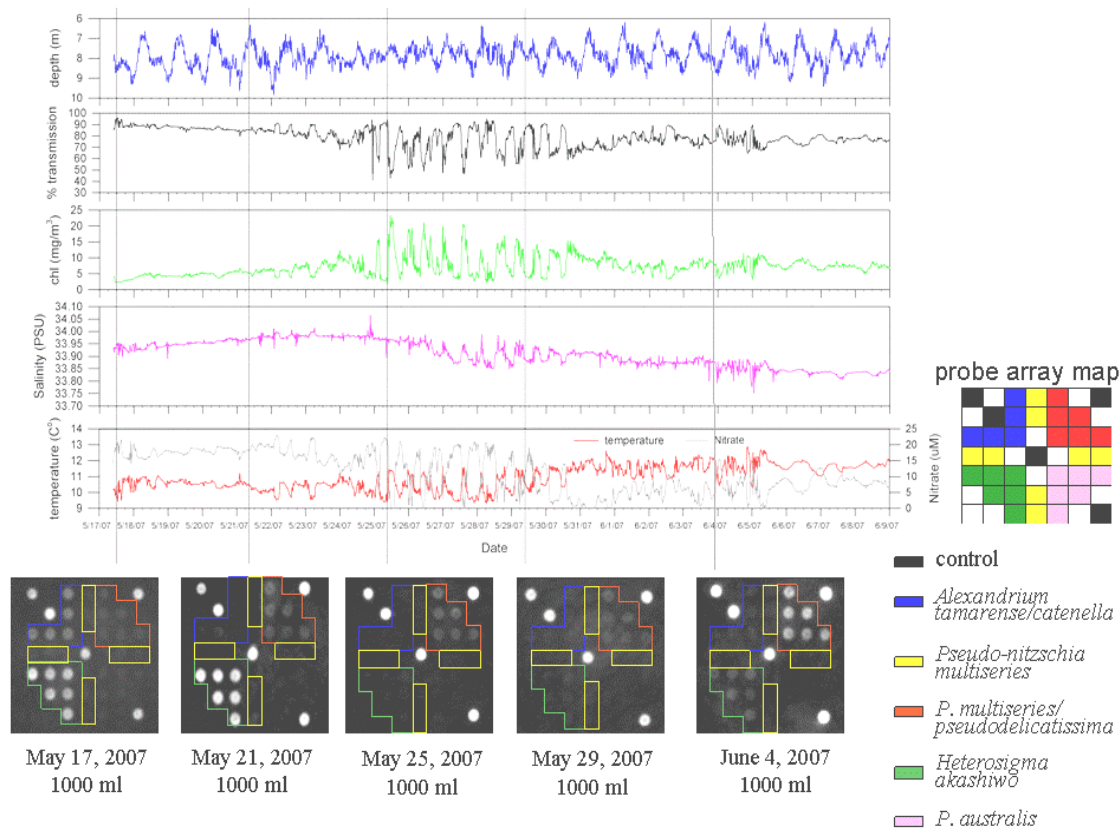


Figure 2. . In situ detection of a variety of HAB species using ESP arrays. The ESP was moored in Monterey Bay, May 17-June 11, 2007. Top four graphs show physical and chemical data collected by contextual sensors. The bottom images show the developed arrays; colored boxes indicate the different algal species/groups detected. Sample volume is shown underneath the array. The arrays shown are ~15mm x 15mm. The series shows a transition from a phytoplankton community on May 15 that included *Alexandrium catenella* (~200 cells/L) and *Heterosigma akashiwo* (~20,000 cells/L) and a trace of members of the *Pseudo-nitzschia multiseries/pseudodelicatissima* complex, to one on June 4 where the former two species are diminished and *P. multiseries/pseudodelicatissima* are clearly present (~20,000 cells/L; from Greenfield et al. in prep.). During this same deployment, assays targeting groups of marine bacteria and invertebrates were also run (e.g., see http://www.mbari.org/ESP/field_data/2007/Bacteria_2007.htm).

Field testing of the 2G ESP began in 2006. Since that time we have deployed the device seven times in surface waters for periods of several weeks to a month. In addition, the core ESP used in surface waters has undergone two field campaigns to 1000m, with each campaign composed of three dives aboard an ROV². All of these deployments were in Monterey Bay, CA. While moored in shallow water, the core ESP has successfully automated application of three different classes of DNA probe arrays (HABs, bacteria/archaea, invertebrate larvae) and the DA assay in single deployments lasting up to 30 days (e.g., Figs. 2, 3). The instrument was programmed to carry out assays at prescribed dates/times, and contextual sensors were programmed to sample several times per hour. Manuscripts that document these milestones are in preparation.

² This project is sponsored primarily by NASA with the aim of developing the ESP system for year-long deployments at cold seep and hot vents to study the changes in microbial community structure in response to changes in seismic activity, fluid flow, and water chemistry (etc.).